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BUSINESS CYCLES AND ACQUISITION POLICY: ANALYSIS OF M&A DEALS OF METALLURGICAL COMPANIES

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Abstract: Business and management literature pointed out on the existence of business cycles and on the importance of conducting countercyclical mergers and acquisition policy. However, according to the merger wave theory in practice acquisitions are likely to be procyclical because of real and behavioral factors. The majority of empirical papers finds positive link between M&A activity and state of the cycle, suggesting that acquisitions are procyclical. This paper tests whether M&A deals of metallurgical companies in China, Russia and India are procyclical. The results show that deals are indeed procyclical, but only at a glance. Introducing intermediate state of valuation in the metal market indicates that the majority of acquisitions were made when prices where close to the neutral state. As the result, acquisition policy can be characterized as neutral to the state of the cycle.

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Introduction

Business cycles may have significant impact on the state of the economy and on particular markets. Taking into account business cycles may be beneficial for corporate strategy. However, the topic of business cycles is not well developed in the management literature. Oil price shock (2014) and decline of metal prices (2013) are recent examples of existence of importance of business cycles. These events have led to the changing of corporate strategies and major losses. During the crisis companies in oil and metal markets switched corporate strategies from expansion to cost cutting and amended their capital expenditure plans. Industry crisis caused by the change of business cycle leads to increasing risks of insolvency and bankruptcy. Insolvency risks may be exacerbated during boom period because of increasing corporate debt. Russian metallurgical companies RUSAL and Mechel are examples of companies which faced risk of insolvency due to high level of corporate debt acquired during the boom period in the metallurgical industry.

According to the definition of National Bureau of Economic Research (NBER), business cycles are simultaneous and unilateral changes in economic indicators, which are usually divided on stages of growth and decline. The highest point is called a peak and the lowest point is called a trough. In the United States NBER established a special committee called «Business cycles dating committee» which publishes information regarding state of business cycle on macroeconomic level. This committee is widely recognized as official source of business cycle information for the US. The committee makes its decisions based on several economic indicators, including GNP (gross national product), employment, real wages and wholesale sales. Alternative business cycle indicator is GDP recession. According to this indicator, two subsequent quarters of negative change in GDP is regarded as recession.

Strategic management does not place much attention on the business cycle issue (Mascarenhas, Aaker, 1989; Broomiley, Navarro, Sottile, 2008). According to the business cycle management concept (BCM) companies should pursue countercyclical policies across several directions of activity, including production, finance, marketing, etc. In the context of mergers and acquisitions the business cycle management concept recommends acquiring assets when prices are low and selling (if necessary), when prices are high. However, research shows that firms typically fail to recognize the existence of business cycles and act procyclical. Even those firms, that pursue countercyclical policy, limit it only to one or two directions. According to another concept called merger wave theory (Furfine, Rosen, 2011) there are factors which makes M&A policy procyclical: risk management, demand driven growth and pattern of financing. According to the merger wave theory, decision to acquire may be made due to risk – management concerns, for example, vertical integration with the purpose to reduce cash flow uncertainty (Garfinkel, Hankis, 2011). In addition, financial institutions are eager to provide financing to developing and growing industries and vice versa, thus exacerbating cycle pattern.

M&A deals are strategic tools of expansionary policy of metallurgical companies – they were used to acquire metal miners in resource – rich regions (for example, Africa), to acquire metal plants (North America, Europe) or to acquire trading companies. Except that it can be used as a tool, M&A deal has financial consequence – increasing debt (if it is debt – financed). This, in its turn may lead to increasing risk of insolvency and bankruptcy.

Thus, there are two perspectives on whether M&A policy is countercyclical or procyclical. According to the business cycle management concept (BCM) the companies should pursue countercyclical policy. According to the merger wave theory, there are several factors which in practice makes the policy procyclical. The goal of the research is to detect whether the M&A policy of metallurgical companies was procyclical or countercyclical: whether ac-

quisitions of assets were made when the market prices were high or low. The research is limited to the M&A deals of metallurgical companies from Russia, India and China during the last metal price cycle (2000-2014). The paper consists on following parts: literature review (summarizes recent research regarding M&A policy and commodity price behavior), data and methodology part, results and conclusions.

Literature review

Business cycle research was limited in business and management literature. It seems that the first paper devoted to the problem was the paper by Mascarenhas and Aaker (1989). They formulated the business cycle management concept, according to which business cycles have significant impact on the state of the market and corporations and that they should be taken into account. Accordingly, companies should pursue countercyclical policies, for example, saving during boom period and acquiring assets in times of recessions. Broomiley, Navarro and Sottile (2008) provide management literature survey from 1980 and show in different functional directions of management (finance, marketing, production) there were paper which pointed out on the importance of conducting countercyclical policy.

One of the first papers devoted to the mergers and acquisitions in the context of business cycle is the paper by Yagil (1989). He argued that acquisitions targeted on diversification are negatively related with risks of insolvency and thus provide positive synergy effect. However, it should be noted that this conclusion was the consequence of assumption of risk diversification.

One of the concepts developed in the M&A literature is the concept of merger waves. The concept refers to cyclical waves of mergers which are correlated with developments in capital markets and the economy in general. Contrary to the neoclassical model, the merger waves theory states that mergers are driven not only by «real» factor, but also by behavioral factors. Among commonly mentioned factors are: using acquisition as a strategic tool for vertical integration, cyclical bubbles caused by financing (financial institutions and capital markets), managerial short – termism and other behavioral factors (Furfine, Rosen, 2011). Another factor of merger waves can be industry deregulation (Ovtchinnikov, 2013).

Ditmar and Ditmar (2008) studied relationship between such managerial decisions as mergers and acquisitions, share buybacks and equity offerings. They revealed that such decisions have a wave pattern and that they are related with the state of business cycle. This supports proposition that acquisitions are procyclical.

Martynova and Renneboog (2008) point out that M&A activity demonstrates cyclical patterns and presence of takeover (merger) waves. They conclude that merger waves start because of technological changes and positive economic environment, but in the end of the review period they are driven by non – rational factors, such as market overvaluation and agency problems. Gugler, Mueller, Weichselbaumer (2012) investigated mergers and acquisitions with the purpose to test whether merger waves are caused by real or behavioral factors. The authors concluded the merger waves are explained by behavioral factors. On the other hand, Harford (2005) concluded that merger waves are caused by regulatory, economic and technological shocks, the last two factors support neoclassical explanation of merger waves.

One of features of the M&A deals is paying with stock of the company rather than cash. Research shows that market valuation is one of the determinants of merger activity (Rhodes – Kopf, Robinson, Viswanathan, 2005). Empirical research often confirms that in practice M&A deals are indeed financed with overvalued shares and this is related with negative long – term return (Schleifer, Vishny, 2003; Vermaelen, Xu, 2014). This finding also supports the argument that M&A deals are procyclical. Ismail and Krause (Ismail, Krause, 2010) investigated determinants of method of payment in mergers and acquisitions and found a new signif-

icant determinant – correlation of stocks of target and acquirer and documented that majority of other determinants were found to be not significant. They point out that there is still gap in the literature with respect to determinants of method of payment.

Huh (2015) was studying impact of performance of acquired metallurgical firms. He concluded that acquired by financial institutions metallurgical companies show poor performance when comparing with those acquired by metallurgical companies. This finding suggests that financial institutions may cause bubbles in the metal markets.

Aharon, Gavious and Yosef (2010) investigated development of mergers and acquisitions along the period of 1993 – 2005 with the goal to evaluate the link between them and developments of capital markets. They concluded that at the beginning of the reviewed period investors seemed to ignore state of the cycle, but in the end of the reviewed period they became less affected by cyclical euphoria and depression in capital markets.

The literature review shows that there are several arguments that M&A policy is procyclical. It may be caused by real factors (such as technology shocks, state of the economy) and behavioral patterns. All factors suggest that M&A deals are procyclical: acquisitions are made when market prices are high. Because of the global nature of metal markets, it is suggested in the research that there are no differences in cyclical pattern across countries. Correspondingly, the paper states and tests following propositions:

P1: *Mergers and acquisition activity is positively related with the overvalued state of the metal market.*

P2: *Merger and acquisition activity is not related with country of the company - acquirer.*

The commodities market and metal markets in particular were subject to considerable research in last decade. This can be explained by the emerged concept of «super cycle» which refers to the unusually long period of increasing commodities prices from 2000 year. One of latest research on commodity prices (Ertern, Ocampo, 2012) was focused on food, metal, oil and other commodity markets. Using data since mid-XIX century authors have found 4 «super cycles», the latest of which began in the begging of last century. Authors concluded that all commodities, except oil, are related with output indicator GDP. This means, that business cycles in these markets is related with business cycle in the whole economy. Theoretical papers also confirm link between output indicators and metal prices, which is supported by empirical research (Issler, Rodriges, Burjack, 2014). It should be noted, that the link in theoretical research between metal markets and aggregate economy state is determined by the cost minimization model of firm behavior in industries where prices depend mostly on the state of demand. Empirical research also shows that behavior of metal prices is not compatible with random walk hypotheses (Roberts, 2009). It is also found, that periods of growth have longer duration than periods of decline (in macroeconomics it is vice versa).

Thus, research on metal prices shows that metal prices are characterized to show cyclical pattern in both short – term and long – term («super cycles») periods. For this reasons, researchers use non – linear techniques to model metal price behavior.

The problem of detecting type of M&A policy (whether it is countercyclical or procyclical) requires formal statistical methods. Tan and Mathews (Tan, Mathews, 2010) provide survey on different methods of detecting state of the business cycle in economic and business literature. They arrive to the conclusion and business and management literature borrows such tools from economic literature. They methods of detecting state of the cycle as either parametric or non – parametric. Parametric group includes methods which apply econometric models to time series data. Usually time series data is seasonally adjusted and corrected for inflation, US Consumer Price Index is widely used as common measure of inflation. Advantages of parametric methods are objectivity and accuracy; disadvantages are requirement to apply complex statistical tools which may not be easy interpret. Nonparametric group includes informal and formal methods of evaluation of business cycle state. The former refers to experts' opinions and forecasts while the latter refers to formal rules of detecting state of the business

cycle. One of the examples of formal methods is NBER business cycle rule which is used in estimating state of the cycle. According to the rule, first three and last three points cannot constitute either peak or through, also cycles cannot be less than specified duration. Taking into account such constraints, the point is classified to be either in the growth or recession period. It should be mentioned, that NBER announces change of business cycle state with a significant delay: for example, it detected in December 2008 that the last peak occurred in December 2007, and that last trough occurred in June 2009 only in September 2010. Except NBER method, analysts' forecasts also belong to nonparametric group. However, they are criticized to be dependent on opinion of other forecasters, to show the pattern of herd behavior: sometimes they are concentrated, sometimes they are deliberately dispersed (Rulke, Silgoner, Worz, 2016). Research shows that forecasters lack strong capabilities of forecasting state of particular markets (Pelaez, 2015) or state of the economy (Ilmakunnas, 1996; Fildes, Steckler, 2002). The advantage of nonparametric methods is easiness of interpretation, but they lack mathematical rigor.

In the parametric group most widely used methods are Markov regime switching models, statistical filters (Hodrick – Prescott and Baxter – King filters) and ARIMA models (Erten, Ocampo, 2012). Markov regime switching models introduce non – linearity by allowing switching of coefficients, the switching is governed by Markov process. Such models were developed for studying business cycle in economics (Hamilton, 1989), but are also used business research (Liu, Chyi, 2006). Hodrick – Prescott filter was also developed for economic research, but it is often applied in business studies (Holdrick, Prescott, 1997). Markov regime switching models allow to estimate the state of the process (in practice two states are used). The goal of the Hodrick – Prescott and Baxter – King filter is to determine long – term trend and cyclical component. These methods allow to estimate whether the state of the process was below or above long – term trend.

Research methodology and data

The paper uses several approaches to the problem of determining state of the metal market. The first method is Markov regime switching model with two and three states. There – state Markov regime switching model was used with the purpose to introduce intermediate state of the market. Such intermediate state includes deals which are neutral to the state of the market (because of the restriction in the two state model all deals must be characterized either as procyclical, or as countercyclical). Metal prices in the 2014 year can illustrate the problem. During that period prices declined, then were stable for some time, then they declined again. Two state model identifies the intermediate state as the period of growth because of the two state constraint, while three – state model identifies that period as period of stable prices. The paper used also Hodrick – Prescott filter to determine state of the cycle, which is also used in business and economic studies. It was proposed by Hodrick and Prescott in 1997 to measure the business cycle.

Thus, the paper used three criteria of the state of the metal market: Markov regime switching models with two and three states and Hodrick – Prescott filter. In case of MRSM model estimated state is directly interpreted and the state of the market. Hodrick – Prescott filter provides quantitative measure of deviation of current state from long – term trend (positive corresponds to overvaluation, while negative value corresponds to undervaluation).

The paper used following autoregressive Markov regime switching model (MRSM – AR(1)):

$$M_t = a_1 s_t + \theta s_t M_{t-1} + \varepsilon_t$$

$$P[S_t = 1 | S_{t-1} = 1] = p$$

$$P[S_t = 0|S_{t-1} = 1] = 1 - p$$

$$P[S_t = 0|S_{t-1} = 0] = q$$

$$P[S_t = 1|S_{t-1} = 0] = 1 - q$$

where M_t – value of metal price index at time t,

s_t – unobserved state of the system,

a_1 – average value of metal price index in the state s_t,

θ – autoregressive parameter in the state s_t,

ε_t – random error,

p – conditional probability that current state is 1 given that the previous state was the state 1,

q – conditional probability that the current state is 2 given that the previous state was the state 2.

Switching of the state is governed by Markov process with transitionary probabilities p and q (in the specification with two states, but it can be extended to the model with three states). Because the model includes unobserved (latent) variables, the estimation procedure is not maximum likelihood (ML), but expectation maximization (EM). The EM algorithm is iterative and consists of two stages. In the first stage function for the expectation of the log-likelihood is created, on the next step it is maximized.

Alternative method of determining business cycle is Hodrick – Prescott filter. It estimates long-term trend and deviation from it (cyclical component). While in MRSM model the estimated state of the model is directly interpreted as the state of the underlying process, in the case of Hodrick – Prescott filter the value of cyclical component is used to interpret the state of the process: if it is positive (implying current value is above long – term trend), then the market is overvalued and vice versa.

Hodrick – Prescott filter (Holdrick, Prescott 1997) model is follows:

$$M_t = g_t + c_t, \qquad t = 1, \dots, T$$

where M_t – current value of metal price index,

g_t – value of long - term trend,

c_t – cyclical component, deviation of current value from long – term trend.

By the design, sum of all cyclical components is equal to zero. Long – term trend is estimated by solving following problem:

$$\min_{\{g_t\}_{t=-1}^{T}} \{\sum_{t=1}^{T} c_t^2 + \lambda \sum_{t=1}^{T} [(g_t - g_{t-1}) - (g_{t-1} - g_{t-2})]^2\}$$

The parameter λ plays important role because it corrects sensitivity of the filter to changes in growth rate. When $\lambda \to 0$ the long – term trend becomes close to the time series itself, when $\lambda \to 0$ the long – term trend becomes close to linear regression line. In the original paper by Hodrick and Prescott it was shown that if cyclical component is distributed normally, then optimal value of λ can be calculated. In the original paper the value of 1600 was used (many papers used same value). In this paper the optimal value is calculated in accordance with Hodrick and Prescott procedure and it equals to 1296, which is close to the value of the original paper.

Seasonal adjustment and correction for inflation of time series data may have significant impact on direction of price movements and cycle detection. Research on this issue (Matas-Mir, Osborn, Lombardi, 2008) has shown that seasonal adjustment makes recessions longer but shallow. It also leads to worse identification of ending of the recession, but helps to detect the beginning of it.

This research uses S&P Goldman Sachs Commodity Index – All Metals as an aggregate indicator of metal prices. This index includes market prices of key ferrous and non-ferrous metals. Another widely used index in London Metal Exchange Index (Roberts, 2009), which references 6 industrial metals. These indexes include overlapping metals and thus there is high correlation between them (Appendix, Figures 1-2). The choice for S&P Goldman Sachs Commodity Index – All Metals index was made because it includes more metals, among them are precious metals (gold and silver) and because the deals sample includes companies mining relevant metals. The choice for aggregate index was made because often one metallurgical company provides different types of metals and because deals sample includes companies operating on different metal markets.

Because the index includes period from 2000 to 2014, nominal metal prices were corrected for inflation. The inflation measure is based on average inflation in top 15 economies weighted by their share in GDP. This measure is close to US CPI index which was 2% - 3% during that period (Appendix, Figure 3 - 4). Adjusting for inflation has following impact on data – it makes the decreases the growth and increases the decline of prices, the impact of the inflation adjustment increases toward the end of the sample period. Because of the absence of any seasonality, no seasonal adjustment was made.

The source of the data is ZEPHYR Bureau van Dijk database. The query had following constraints: minimal acquired share: 10%, time interval: 2000 – 2014, industry type: metal miners (both acquirer and target in the M&A transaction). The size of the sample is 262, among which 158 deals refer to China companies, 69 – to Russia and 35 – to India. Among 262 deals 148 have deal value of $100 ml. or below, 77 – between $100 ml. and $500 ml., 37 – more than $500 ml. Time of the deal was matched with the state of the market with the three – month period before the month of competing M&A deal.

Empirical results

The paper uses MRSM – AR(1) model which was chosen over MRSM – AR(0) model using AIC criterion (Appendix, Figure 5 – 10). Subsequent increases in order of AR(p) process do not lead to significant improvement according to AIC criterion.

Number of states	$MRSM - AR(0)$	$MRSM - AR(1)$
$K = 2$	1639.66	1266.703
$K = 3$	1650.71	1248.313

Table 1. AIC value for the autoregressive Markov regime-switching models with two and three states

The table provides AIC values for MRSM models with zero and 1 order of AR process. These results support choice for MRSM-AR(1) model. Also, the p-value of the statistic of augmented Dickey – Fuller test for pooled residuals of MSRM – AR(0) model is 0.34, while it is 0.01 in case of MRSM-AR(1) model.

Parameter	$S = 1$ (undervaluation)	$S = 2$ (overvaluation)
a_1	7.23***	- 3.53***
θ	0.904	1.0669**

*Table 2. Parameter estimation of the MRSM – AR (1) model with two states. *** - significance at 1% level, ** - significance of 5% level.*

To the state / From the state	*State 1 (undervaluation)*	*State 2 (overvaluation)*

State 1 (undervaluation)	0.47	0.46
State 2 (overvaluation)	0.53	0.54

Table 3. Estimation of Markov switching probability matrix of MRSM – AR(1) model with two states.

The tables 2 – 3 show estimated values of the parameters of the MRSM – AR(1) model with two states. It should be noted, that the model and all coefficients except one are significant. Estimated probability matrix shows that the process has roughly equal chances to switch to another state.

Parameter	$S = 1$ *(overvaluation)*	$S = 2$ *(intermediate)*	$S = 3$ *(undervaluation)*
a_1	- 11.20***	-1.82	8.00***
θ	1.18***	1.0355***	0.89***

*Table 4. Parameter estimation of the MRSM – AR (1) model with three states. *** - significance at 1% level.*

To \ From	*State 1 (overvaluation)*	*State 2 (intermediate state)*	*State 3 (undervaluation)*
State 1 (overvaluation)	0.498	0	0.168
State 2 (intermediate)	0	0.635	0.495
State 3 (undervaluation)	0.502	0.365	0.337

Table 5. Estimation of Markov switching probability matrix of MRSM – AR(1) model with three states.

Tables 4 – 5 show estimated values of parameters of MRSM – AR (1) model with three states. It should be noted that the model and all coefficients except one were found to be significant. The switching probability matrix differs significantly from the one of model with two states and requires some comments. Estimated probability shows that probability of switching from the intermediate to the overvalued state is almost zero, as well as probability of switching from overvaluation to the intermediate state. Thus, the estimated probability matrix implies that periods of overvaluation are superseded with the periods of undervaluation and that there is almost zero probability that intermediate state will be superseded by the overvaluation state. It also implies that the period of overvaluation can occur only after the period of undervaluation. This contrasts with the switching behavior of metal markets found in the model with two states where probabilities of changing the state are roughly equal. The estimated probability matrix that the average expected duration of the state 1 is 2 month, of the second state – 2.73 month and of the state 3 – 1.5 month.

Appendix includes results of applying Hodrick – Prescott filter toward corrected for inflation S&P All Metals Commodity Index. The filter reveals two cycles in metal prices which occurred before and after 2008 crisis.

Applying MRSM models and Hodrick – Prescott filters allowed to obtain estimates of business cycle states in the metal markets. The time of the deal was matched with the identified state to evaluate whether the deal was procyclical or countercyclical.

Country	*Undervaluation state*	*Overvaluation state*	**Overall**
China	43 (27%)	115 (73%)	158
Russia	18 (21%)	51 (74%)	69

India	14 (40%	21 (60%	35
Overall	75 (29%)	187 (71%)	262
χ^2 *= 2.5878, df =2, p-value=0.2742*			

Table 6. Results of matching M&A deals (classification of M&A deals) with the state of the market in the MRSM – AR(1) model with two states.

The table shows that the majority of the deals were made on overvalued market. The table also shows that differences across countries are not significant.

Country	*Overvaluation state*	*Intermediate state*	*Undervaluation state*	**Overall**
China	20 (13%)	100 (63%)	38 (15%)	158
Russia	9 (13%)	43 (62%)	17 (25%)	69
India	3 (9%)	22 (63%)	10 (29%)	35
Overall	**32 (12%)**	**165 (63%)**	**65 (25%)**	262
χ^2 *= 0.68907, df =4, p-value=0.9527*				

Table 7. Results of matching M&A deals with the state of the market in the MRSM – AR(1) model with three states.

The table shows that in the case of three states model most deals were made when the market was in the intermediate state (about 2/3). Another important finding is that contrary to the model with two states, the number of deals which were made during undervaluation state is twice as higher than the number of deals during overvaluation period. It should be noted, that among 187 deals identified as procyclical by the model with two states only 32 deals are identified as procyclical in the model with three states. The only similarity with the two state model case is that country differences are also insignificant.

The third criteria of determining M&A deal type which was used in this research is Hodrick – Prescott Filter. In this case type of the deal is determined by the size of the cyclical component: if it is above 10% of long-term trend, than the deal is classified as procyclical, if it is below 10% of long – term trend, than it is classified as countercyclical, otherwise – as neutral.

Country	*Undervaluation state*	*Intermediate state*	*Overvaluation state*
China	36 (23%)	63 (40%)	59 (37%)
Russia	24 (35%)	25 (36%)	20 (29%)
India	9 (26%)	16 (46%)	10 (29%)
Average	**65 (25%)**	**104 (40%)**	**93 (35%)**
χ^2 *= 4.4939, df =4, p-value=0.3433*			

Table 8. Classification of M&A deals with respect to the state of the market estimated by Hodrick – Prescott filter.

The results show that the majority of deals were neutral with respect to the state of the market, although in this case the share of neutral deals was less than 50%. The chi squared test also shows that the country differences are insignificant, like in previous cases. Absence of significant differences across countries supports the second proposition of the research.

Overall, the research shows that M&A policy of metallurgical companies from Russia, China and India can be classified as procyclical (71% of deals), but only at the first glance. This result depends on the two state constraint, according to which a deal can be either procyclical (made on overvalued market) or countercyclical (made on undervalued market). Removing this constraint shows that the majority of deals were made during intermediate period and are neutral to the state of the cycle. Correspondingly, the first proposition of the research (M&A deal are procyclical) is not supported.

Conclusions

The goal of the research was to determine whether M&A policy of metallurgical companies of Russia, China and India was procyclical or countercyclical. Procyclical policy refers to acquiring assets during periods of overvaluation and countercyclical refers to buying in the periods of undervaluation. Markov regime switching models (with two and three states) and Hodrick – Prescott filters were used to determine state of the cycle based on S&P metal price index, which includes key metal prices. Markov model with three states was used to introduce state of intermediate valuation in addition to under- and overvaluation states. Overall, there were three methods of estimating state of the business cycle. Dates of the deals were matched up with states of the market determined by the one of three criteria.

The results are mixed: according the model with two states, the majority of deals were made during periods of overvaluation, suggesting that the policy was procyclical, however introducing state of intermediate valuation leads to the conclusion that the M&A policy was neutral. Finally, the Hodrick – Prescott filter also suggests that the M&A policy was neutral. According to the results, about 70% of deals were made when the market was overvalued according to the two-state model, but only 20% of those deals are recognized to be procyclical in three-state model (the rest of the deals were recognized to be made in the intermediate level). According to the MRSM model, 63% of M&A deals occurred at the intermediate state and 25% - during overvaluation period, according to the HP filter 40% of the deals occurred at the intermediate state and 35% - during overvaluation period.

Another important finding of the research is absence of country differences across Russia, India and China. This finding is supported by all methods of research. It was concluded that M&A policy of companies from these countries belongs to the same type and differences are not significant.

Finally, application of Markov regime switching models provided insight into metal price behavior. First of all, the research has shown that contrary to the behavior of economic indicators, average duration of undervaluation is less than the same of overvaluation (in economic studies length of recession is reported to be less than the length of growth period). Secondly, it was shown that during period of overvaluation prices either continue to rise or the market switches to the state of undervaluation with equal chances, and when the market is in intermediate state it can either continue to be in that state or switch to undervaluation state (with probability 1/3). These results indicate that periods of overvaluation always finish with period of undervaluation, rather than with the intermediate state and that the period of overvaluation can only arise from period of undervaluation.

The paper contributes to the M&A and the market timing literature. At the first glance, it supports merger wave theory, according to which M&A deals are likely to be procyclical (because of risk management efforts to reduce cash flow uncertainty using vertical integration, procyclical financing, etc.). However, the paper also shows that inclusion of the intermediate state leads to the conclusion that M&A policy can be neutral to the cycle (neither procyclical, nor countercyclical). The conclusion that M&A deals are procyclical is affected by the two – state constraint (or, alternatively, that M&A deals are either procyclical or countercyclical). Removing this limitation shows that the majority of the deals are neutral to the state of the cycle.

Further research can provide additional insight into the cyclical type of M&A policy. One of the important factors is the way of financing and the method of payment. Although acquiring assets during overvaluation period may lead to losses, debt – financed acquisition may exacerbate financial problems. Empirical research shows that despite the incentive to pay for the acquisition with overvalued shares during overvaluation period, not all companies are able to exploit this opportunity because such attempt is recognized as the signal of overvalua-

tion in the relevant markets. Unfortunately, this research lacks the data for the method of financing and cannot address the question.

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Appendix

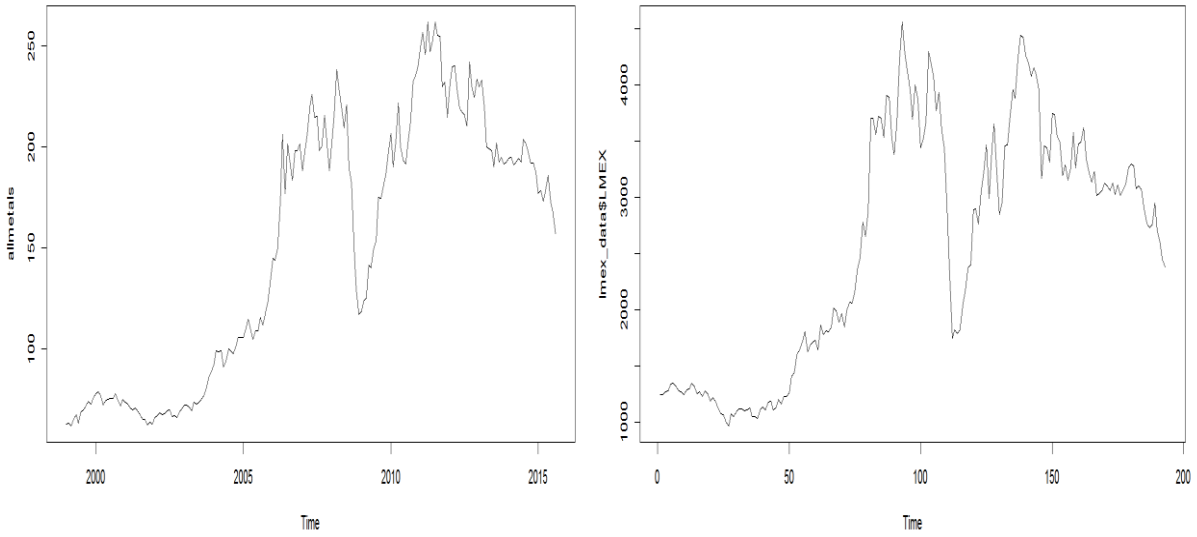


Figure 1 – 2. S&P Goldman Sachs Commodity Index – All Metals (left) и London Metal Exchange (right). Time interval: January 1999 – January 2015.

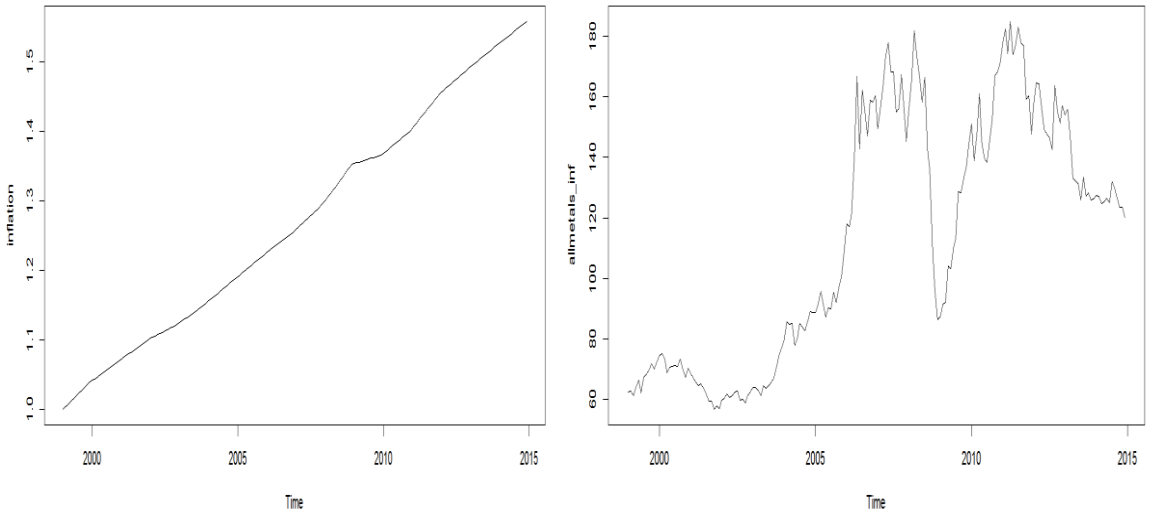


Figure 3 – 4. Inflation index and inflation adjusted S&P Goldman Sachs Commodity Index – All Metals.

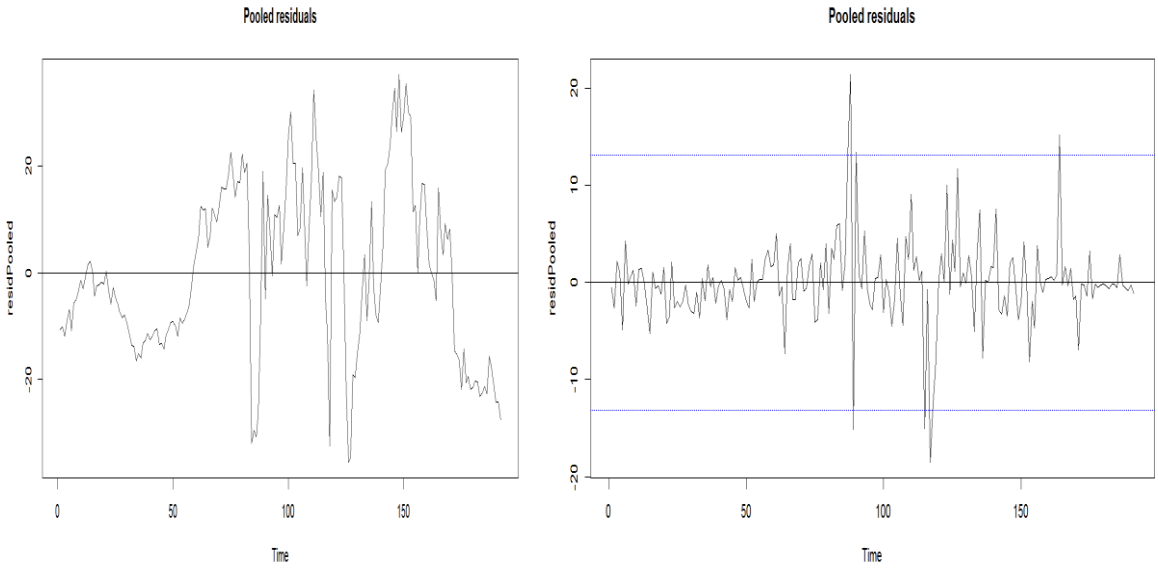
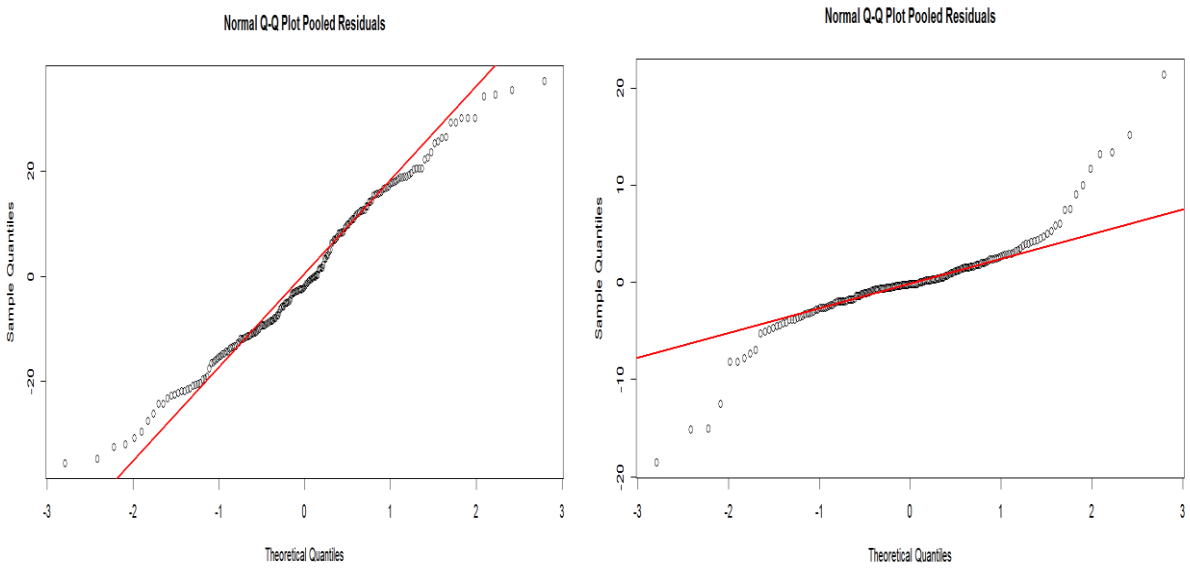


Figure 5 – 6. Pooled residulas of models MRSM – AR(0) и MRSM-AR(1) with two states.



Figuare 7 – 8. QQ plots of pooled residuals of MRSM – AR(0) (left) и MRSM – AR(1) (right) with two states.

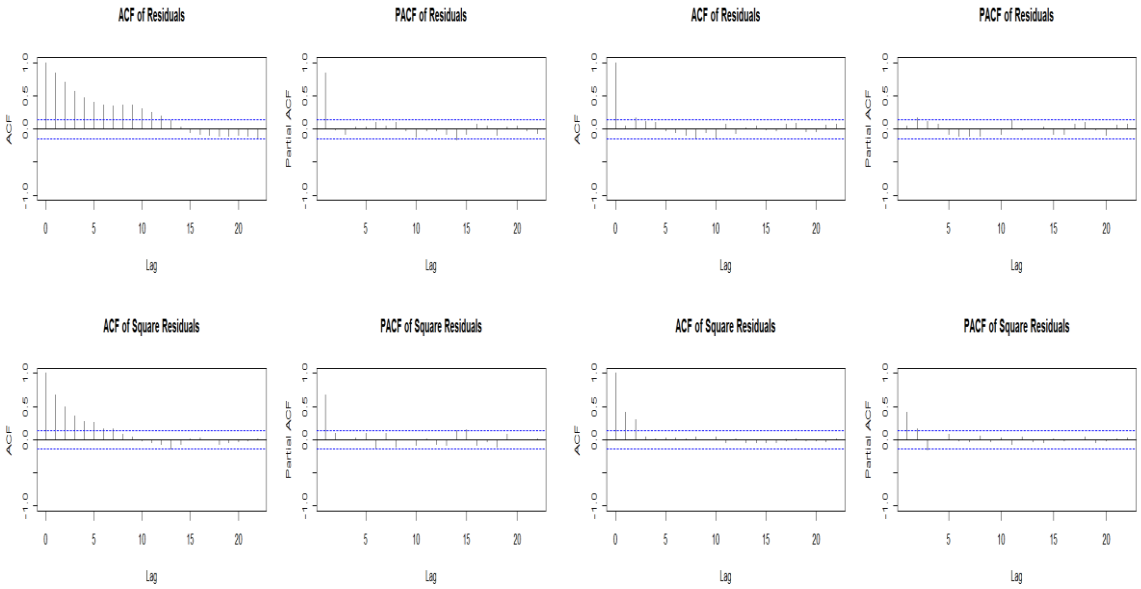


Figure 9 – 10. ACF and PACF functions of MRSM-AR (0) (left) и MRSM-AR(1) (right) with two states.

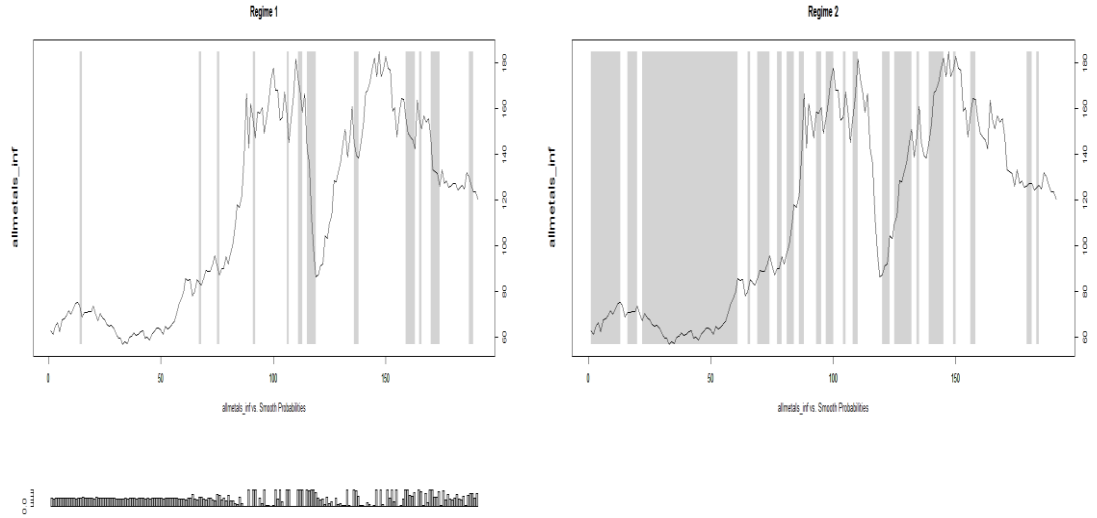


Figure 11 – 12. States of valuation in metal markets in model with two states: undervaluation (left) and overvaluation (right).

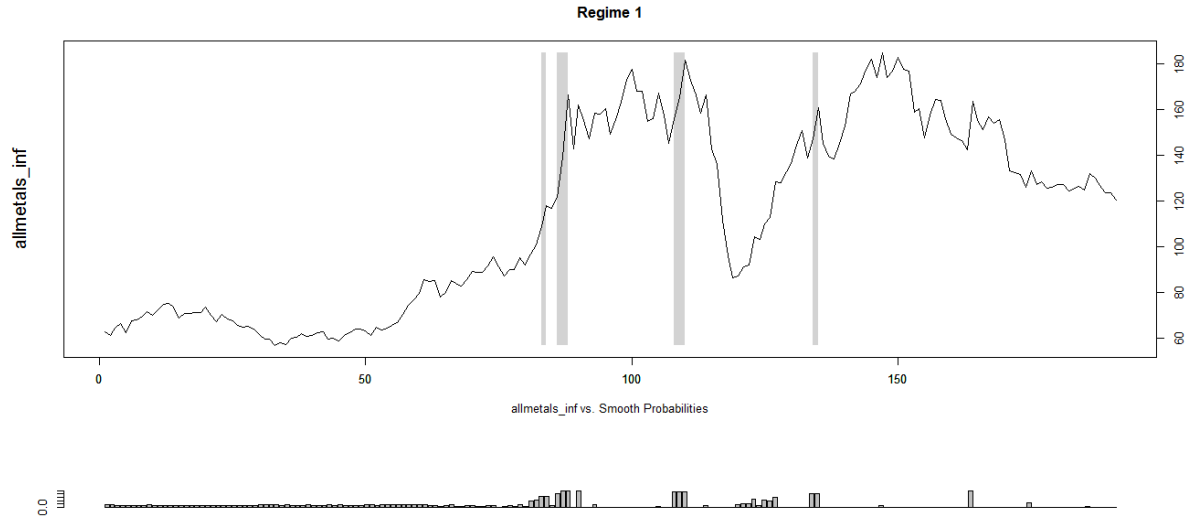


Figure 13. State 1 (overvaluation) in model MRSM – AR(1) for S&P metal price index.

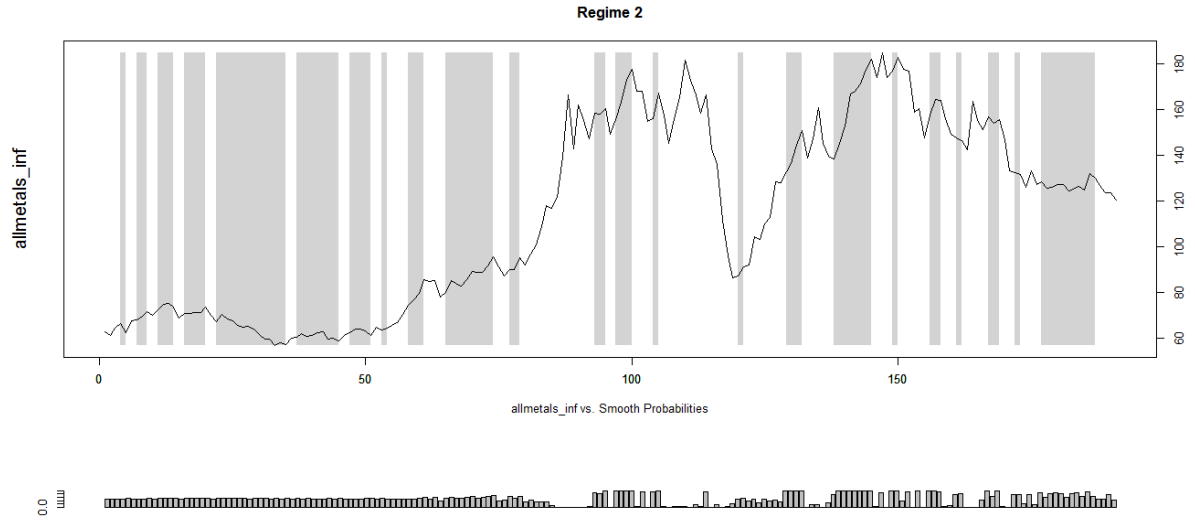


Figure 14. State 2 (stable prices) in model MRSM – AR(1) for S&P metal price index.

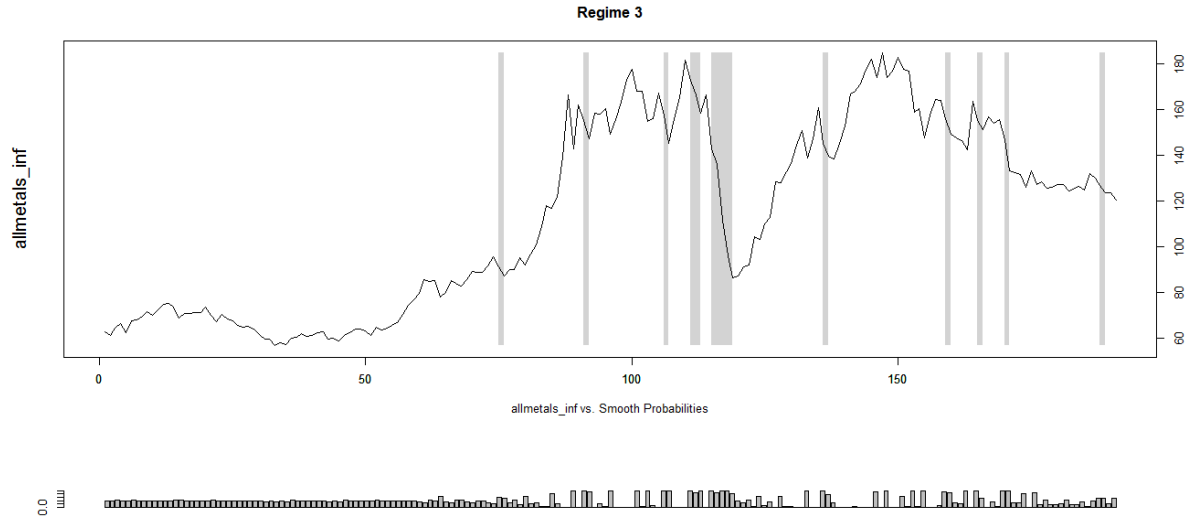


Figure 15. State 3 (undervaluation) in the model MRSM – AR(1) with three states.

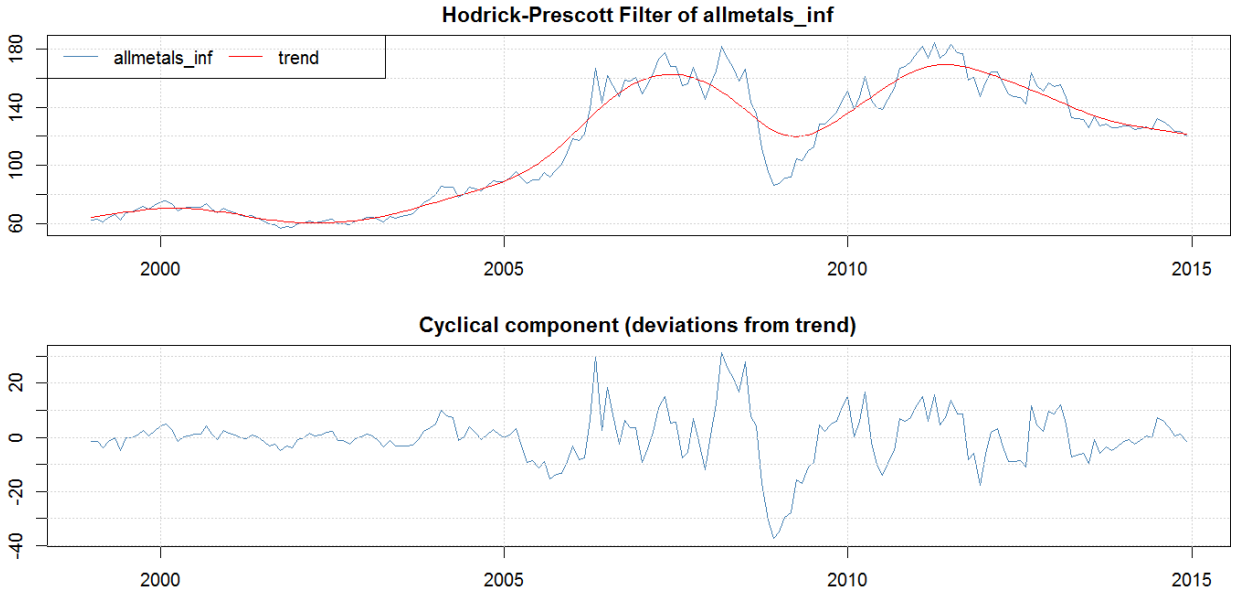


Figure 16. Long – term trend and cyclical component of S&P GSCI – All Metals index. Filter parameter λ is set to 1296.

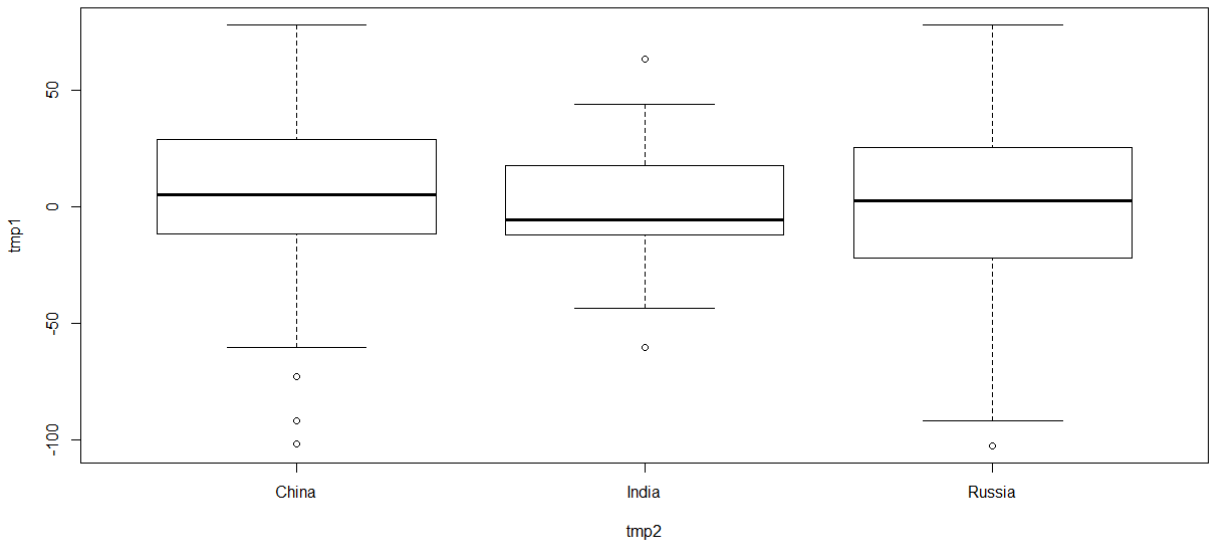


Figure 17. Box plot of cyclical component estimated by Hodrick – Prescott filter.